

Announcing the Final Examination of Ramesh Adhikari for the Degree of Doctor of Philosophy in Physics

Date: Tuesday, November 3, 2015

Time: 2:00 p.m.

Room: PSB 161

Dissertation title:

Translocation of a semiflexible polymer through a nanopore.

Abstract:

The transport of a biomolecule through a nanopore occurs in many biological functions such as, DNA or RNA transport across nuclear pores and the translocation of proteins across the eukaryotic endoplasmic reticulum. In addition to the biological processes, it has potential applications in technology such as, drug delivery, gene therapy, and single molecule sensing. The DNA translocation through a synthetic nanopore device is considered as the basis for cheap and fast sequencing technology. Motivated by the experimental advances, many theoretical models have been developed. In this thesis, we explore the dynamics of driven translocation of a semiflexible polymer through a nanopore in two dimensions (2D) using Langevin dynamics (LD) simulation. By carrying out extensive simulation as a function of different parameters such as, driving force, length and rigidity of the chain, viscosity of the solvent, and diameter of the nanopore, we provide a detailed description of the translocation process. Our studies are relevant for fundamental understanding of the translocation process which is essential for making accurate nanopore based devices.

Outline of Studies:

Major: Physics

Educational Career:

M. S. The University of Southern Mississippi, Hattiesburg, MS, 2009

B. S. Tribhuvan University, Nepal, 2001

Committee in Charge:

Dr. Aniket Bhattacharya (Chair)

Dr. Bo Chen

Dr. Viatcheslav Kokoouline

Dr. Florencio E. Hernandez (External Committee Member)

Approved for distribution by Dr. Aniket Bhattacharya, Committee Chair, on October 20, 2015.

The public is welcome to attend.